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Published in:
Psychiatry Research

DOI:
10.1016/j.psychres.2009.09.015

A confirmatory factor analysis of the Toronto alexithymia scale (TAS-20) in an alcohol dependent sample

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Abstract

Confirmatory factor analyses were conducted to evaluate the factorial validity of the Toronto Alexithymia Scale in an alcohol-dependent sample. Several factor models were examined, but all models were rejected given their poor fit. A revision of the TAS-20 in alcohol-dependent populations may be needed.

Keywords: Toronto alexithymia scale; Alcohol dependence; Confirmatory factor analysis

1. Introduction

Alexithymia refers to difficulty identifying, differentiating and communicating feelings, a lack of imagination and an externally oriented thinking style (Nemiah et al., 1976). The Toronto Alexithymia Scale (TAS-20) (Bagby et al., 1994) is a reliable self-report measure of alexithymia. It consists of three factors: difficulties identifying feelings (DIF), difficulties describing feelings (DDF) and externally oriented thinking (EOT). Given the link between addiction and alexithymia it is important to validate the TAS-20 in substance misuse samples (Thorberg et al., 2009).There have only been a few such studies. The TAS-20 confirmatory factor analyses (CFA) undertaken by Cleland et al. (2005) in a substance disorder sample indicated a marginal fit for the 2-factor model (Loas et al., 1996; Kooiman et al., 2002) and the original 3-factor model (Bagby et al., 1994). In a combined drug and alcohol-dependent group, Besharat (2008) confirmed the 3-factor model, but the psychometric properties of the TAS-20 were described as suboptimal. In a sample composed of a group with substance dependence and a group with eating-disorders (Loas et al., 2001) the original 3-factor structure was confirmed and was a superior fit than the 2-factor model. In a psychiatric sample including alcohol abusers, a 4-factor model consisting of DIF, DDF, pragmatic thinking, and lack of importance of emotions provided the best fit compared to the other models (Mueller et al., 2003). Given the lack of consistency in previous attempts to identify the TAS-20 factor structure in substance-dependent samples, and the lack of such research in groups with primary alcohol-dependence, further studies of this type are warranted. This study aimed to establish the underlying factor structure of the TAS-20 in an alcohol-dependent sample.

2. Method

2.1. Participants

Participants were undertaking outpatient Cognitive-Behavioural Therapy for alcohol dependence at a Brisbane hospital. 210 participants (144 males) with a mean age of 38.17 years (*SD*=10.82) diagnosed with alcohol dependence as assessed by DSM-IV-TR criteria (APA, 2000), Brief Michigan Alcoholism Screening Test (bMAST Pokorny et al., 1972) and the Alcohol Use Disorder Identification Test (AUDIT Saunders et al., 1993) were recruited. Exclusion criteria were a diagnosis of a major co-morbid psychiatric disorder, organic brain syndrome, alcohol-related medical complications or heavy sedation. The time between the last drink and the assessment ranged between 4-14 days. 67.6 % drank daily, 17.1% were binge drinkers and 15.3% drank ≥ twice a week. Usual mean amount of alcohol consumed (in grams) per drinking session was 153.26 (*SD*=102.34) and maximum amount was 240.73 (*SD*=121.00). These variables had approximately 20% missing data. Almost three quarters of the sample (71.1%) used alcohol only. Other life time drug use included cannabis for 22.4% of the sample, amphetamine use for 15.3% and ecstasy use by 8.7%. A minority of the sample had used heroin (5.6%) and 4.1% misused benzodiazepines. Poly-substance dependence was not formally assessed. The Depression subscale from the Depression Anxiety and Stress Scales (DASS-21) screening tool yielded an overall mean score of 31.44 (*SD*=25.00) indicating severe depressive symptoms (see Lovibond and Lovibond, 2002).

2.2. Measures

2.2.1. Toronto Alexithymia Scale (TAS-20)

The TAS-20 is a 20 item self-report measure of alexithymia with acceptable validity and reliability (Bagby et al., 1994; Besharat, 2008; Meganck et al., 2008). A higher score on the TAS-20 indicates a greater level of alexithymia.

2.2.2. Alcohol Use Disorders Identification Test (AUDIT)

The AUDIT is a 10 item instrument measuring three different domains of alcohol misuse: hazardous drinking, harmful drinking and alcohol dependence (Saunders et al., 1993). A total score of ≥20 indicates alcohol dependence.

2.2.3. Brief Michigan Alcohol Screening Test (bMAST)

The bMAST is a 10 item self-report scale that assesses life time alcohol-related problems and alcohol dependence (Selzer, 1971; Pokorny et al., 1972). A score of ≥ 6 suggests alcohol dependence (Kagan-Krieger et al., 2002).

2.3. Procedure

Ethics approval was granted by institutional ethics committees. Less than10% of those people offered a program declined participation. All measures were completed before the first treatment session.

2.4. Data Analysis Methods

Descriptive statistics and intercorrelations were calculated. CFA evaluated the factor structure of the TAS-20. The following CFA fit indices were used: the χ^2 statistic; the Akaike's Information Criterion (AIC) where a lower score for both criteria indicates a better model fit (Tanaka, 1993); the normed χ^2 where values <3 represent a good fit; the Comparative Fit Index (CFI;Bentler, 1990) where values of >0.90 indicate a good fit (Ullman, 2001), and; the root mean square error of approximation (RMSEA) with 90% confidence intervals (Steiger, 1990) where values ranging from <0.06 to 0.08 suggest an acceptable fit (Hu and Bentler, 1999). A χ^2 test was conducted to compare the fit of the competing models. Regression imputation was undertaken for 9 participants to replace missing values for 1-2 items (Hawthorne and Elliott, 2005). An alpha level of $p < 0.05$ was used to determine the significance of correlations.

3. Results

3.1. Means, SD and intercorrelations

The mean score for the TAS-20 was 53.82 (*SD*=11.87), DIF 19.38 (*SD*=6.23), DDF 14.11 (*SD*=4.47), EOT 20.33 (*SD*=4.42), bMAST 16.60 (*SD*=8.27) and AUDIT 26.03 (*SD*=9.80). Pearson's correlations between TAS-20 total score, DIF DDF and EOT were significant (*r*=0.83; *r*=0.87; *r*=0.63 respectively). The DIF scale was significantly correlated with DDF (*r*=0.63) and EOT (*r*=0.19) and DDF was significantly correlated with EOT (*r*=0.43). The AUDIT was significantly correlated with TAS-20 (*r*=0.25), DIF (*r*=0.27), DDF (*r*=0.17), but not EOT (*r*=0.14). Two of the correlations between the bMAST and TAS-20 were significant (total, *r*=0.17; DIF, *r*=0.21) and two were not (DDF, *r*=0.12; EOT, *r*=0.04).

3.2. Confirmatory Factor Analyses

The 2-factor model, which was a combination of the DIF and DDF items (factor 1) plus the EOT items (factor 2), had sufficient fit with the data $\chi^2(165)=348.73$, $P<0.001$; $\chi^2/df=2.11$; AIC; 478.73; CFI=0.85; RMSEA= 0.07 (90% CI=0.062-0.04). The chi-square test and fit indices indicated a better fit for the traditional DIF, DDF and EOT 3-factor model $\chi^2(164)=312.96$, $P<0.001$; $\chi^2/df=1.91$; AIC=444.96; CFI=0.88; RMSEA=0.06 (90% CI=0.055-0.077). However, as the CFI did not reach the >.90 threshold, a chi-square test was performed to determine which among the less-than-perfect competing theoretical models provided the most plausible explanation (see Lance et al. 2006). This comparison indicated a superior fit for the 3-factor model over the 2-factor model (χ^2 difference=35.77, *df*=1, $p<0.0001$). An atheoretical 1-factor model was also tested demonstrating a poor fit to the data $\chi^2(171)=547.11$, $P<0.001$; $\chi^2/df=3.20$; AIC; 665.11; CFI=0.69; RMSEA=0.10 (90% CI=0.093-0.11). No EOT factor parameter estimates were significant, but all DIF and DDF estimates were significant.

4. Discussion

The original 3-factor model provided the most plausible theoretical explanation of the data compared to the other models. It had a significantly lower χ^2 scores as well as a significant chi-square difference indicating a superior global fit. This result supports previous findings (Loas et al., 2001; Mueller et al., 2003; Cleland et al., 2005). DIF and DDF factor loadings were significant and higher than the recommended cut-off (Stevens, 1996), with the exception of DDF item 4. These results are consistent with findings from a recent investigation in a combined alcohol and drug sample (Besharat, 2008) and two other clinical samples (Bressi et al., 1996; Meganck et al., 2008). None of the EOT factor parameter estimates were significant, indicating that these items explained little variance. Although previous studies in mixed addiction samples have found significant parameter estimates for this factor, these studies also report problems with EOT items (Loas et al., 2001; Mueller et al., 2003; Besharat, 2008). The reasons for EOT item inconsistencies are unclear at this stage, but could be related to sample characteristics or they may indicate that EOT is not a feature of alexithymia in substance-dependent samples.

In this group of people with relatively severe alcohol problems, significant, but modest relationships between overall alexithymia, DIF and alcohol measures were found. The EOT factor associations that were not significant, which may be because of poor EOT factor validity. However, similar findings have been obtained for the EOT factor in relation to personality dimensions and psychiatric diagnoses (Bach et al., 1995; Grabe et al., 2000). A limitation of the present study was the relatively small sample size. Utilizing a larger sample may have yielded an acceptable model fit. The criteria used to establish the model fit may have also influenced the results.

In conclusion, all of the previously identified TAS-20 factorial models had to be rejected given the poor fit to the data. A revision of EOT items may be warranted in future

alcohol studies. The counterargument is that such changes could result in a modified construct not true to the original definition (Sifneos, 1996; Loas et al., 2001), and that it may be better to use a well researched scale despite its psychometric shortcomings. For now we suggest caution when applying the EOT scale in alcohol populations whether for clinical or research purposes.

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Table 1. Factor loadings for the 3-factor model

Item	DIF	DDF	EOT
1	0.68		
3	0.44		
6	0.68		
7	0.57		
9	0.73		
13	0.78		
14	0.70		
2		0.77	
4		0.31	
11		0.76	
12		0.57	
17		0.62	
5			0.13*
8			-0.52*
10			-0.11*
15			-0.63*
16			-0.45*
18			0.11*
19			0.05*
20			-0.59*

* $p > 0.05$